



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: Thomas J. Vanderwiel

Group Art Unit: 2125

Application No.: 10/774,220

Examiner: Sean P. Shechtman

Filed: February 6, 2004

For: APPARATUS AND METHOD FOR
CREATING SKETCH-BASED EGGCRATE
SUBSTRUCTURES FOR COMPOSITE PARTS

DECLARATION UNDER 37 C.F.R. 1.132

I, Thomas J. Vanderwiel, declare and state as follows:

1. I am employed by Boeing Company, the assignee of the subject application, and am the named inventor for the subject application. I hold a Bachelor of Science in Mechanical Engineering Technology from the Milwaukee School of Engineering and have about twenty years of experience in tooling design. As a result of this background and experience, I am familiar with tooling design and eggcrate substructures for composite parts.
2. Eggcrate substructures for composite parts are commonly used to lay up composite sandwich panels of the type used in aircraft. These substructures are broadly characterized as having planar panels joined at opposing ends and forming an open cell structures. The substructures are referred to as "eggcrate" because of their resemblance to die cut cardboard crates, which were traditionally used to transport eggs.
3. To confirm the commonly understood meaning of the term "eggcrate substructure" as described above, I performed an Internet search using the Google search engine. I entered the search string "eggcrate layup" as shown in Exhibit A attached. The first page of the search results is shown in Exhibit B attached. The first search result identified the website shown in Exhibit C attached. The caption on the first figure of Exhibit C identifies an "'eggcrate' supporting structure". The identified structure comports with

the eggcrate substructure definition provided above. Thus, the Internet search confirms the commonly understood meaning of "eggcrate substructure" provided above.

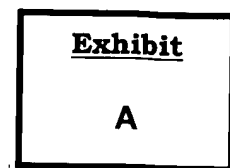
4. Another example of an eggcrate substructure is illustrated in several figures in U.S. Patent No. 6,759,002. Several eggcrate substructures are shown in the figures of the patent. Moreover, the structure is identified as a "egg crate" at column 3, line 2-7. Thus, this additional reference confirms the commonly understood meaning of "eggcrate substructure" provided above.
5. I have reviewed U.S. Patent Nos. 6,775,585 and 6,675,059, 5,701,403 5,321,835 and 4,697,240. None of these references disclose or suggest an eggcrate substructure as described above.
6. I hereby declare that the statements made of my own knowledge are true and that all statements made on information or belief are believed to be true. I acknowledge that willful false statements and the like are punishable by fine or imprisonment or both (18 U.S.C. § 1001) and may jeopardize the validity of this application or any patent issuing therefrom.

Date: Oct 17th, 2005



Thomas J. Vanderwiel

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eggcrate layup

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Exhibit**B****Web**Results 1 - 10 of about 42 for **eggcrate layup**. (0.09 seconds)Did you mean: **egg crate** layup

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... of the desired cure, before **layup** commences, as ... When the lagging thermocouple on **lay-up** reads 115 ... **Eggcrate** structures: This kind of structure is prefabricated ...
cytec.com/business/EngineeredMaterials/Datasheets/CYFORM%2022.pdf - Supplemental Result - [Similar pages](#)

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metal/composite **lay-up** tool facing sheet technique was developed. ... a carbon/epoxy tooling board **eggcrate** was developed to serve as a support structure. ...
www.afrl.af.mil/successstories/1999/tech-tran/tt25.pdf - [Similar pages](#)

Boat Building Repairing weeping FG Diesel tank

... Once the diesel gets >into the **layup** it will find a way out ... Well, the tank is not integral; it was built and set into the **eggcrate**, so I can't fix from outside ...
boatforumz.com/-Repairing-weeping-FG-Diesel-tank-ftopic25282.html - 62k - Supplemental Result - [Cached](#) - [Similar pages](#)

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... Will this be a strong enough **layup** for a coupe ... If you and I are talking the same thing, You are saying you are making an **eggcrate**, (such as a grid from the plan ...
www.fibreglast.com/phpBB2/viewtopic.php?t=230&highlight=&sid=d94fc826dd95415947d2ea71a105ed46 - 77k - Supplemental Result - [Cached](#) - [Similar pages](#)

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... of poly (I like 30min potlife and being able to keep a **layup** "going" untill ... layers of increasingly heavier mat and woven cloth, and finally **eggcrate** braced on ...
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... These females can typically **lay up** to 500 eggs throughout their lifetime. ... you will not see the eggs - some may also lay their eggs on the **egg crate** or pieces ...

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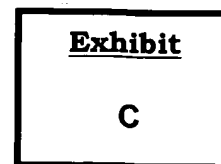
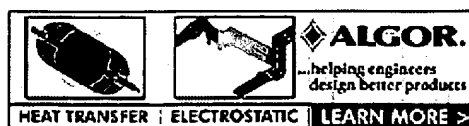
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Two-Sided Tools for Layup of Composite Sandwich Panels

Less floor space is needed for tooling for large panels.

Lyndon B. Johnson Space Center, Houston, Texas

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A simple change in the design of tools used in manufacturing laminated-composite-material sandwich panels reduces the floor area needed to store the tools. To give meaning to a description of this modification, it is necessary to explain the basic function and original design of these tools: The basic function of such a tool is to provide a surface sized and shaped (possibly including a complex curvature) to match one of the two face sheets of the composite sandwich panel to be fabricated. A sheet of laminated composite material in uncured or partially cured form is laid up on the tool surface, then cured to form a face sheet (see Figure 1). The face sheet is then removed from the tool surface. The opposite face sheet is formed in the same manner on another tool, then the two face sheets are bonded to opposite faces of a honeycomb- or eggcrate-like core to form the composite sandwich panel.

Often, tools of this type have structures similar to those of the composite panels to be fabricated; the tools can include face sheets that define the tool surfaces and that are supported by honeycomb- or eggcrate-like structures. Often, the tools are even made of composite materials.

Each tool designed according to the original concept described thus far includes only one tool surface. The modified-tool concept calls for two tool surfaces for forming both face sheets of the composite sandwich panel that one seeks to fabricate. Like the panel itself, the tool of modified design features two face sheets (which define the two tool surfaces) bonded to opposite faces of a honeycomb- or eggcrate-like core (see Figure 2). To facilitate handling, the tool can be mounted in a steel frame; the mounting should be loose, with sufficient clearance to allow the tool to "float" in the frame to accommodate differential thermal expansion between the tool and the frame.

The biggest advantage of the two-sided tool design over the single-sided tool design is that twice as much mold-surface area is accommodated in the same floor area — an important consideration in the manufacture of large panels. In addition, the fabrication of two tool faces held on a common supporting structure involves less labor than does fabrication of two tool faces on individual supporting structures. The two-sided tool design could prove useful in the manufacture of a variety of curved composite-material sandwich parts; for example, boat hulls and outer shells of automobiles.

MSC-22725

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